Maury River

1991

A SURVEY OF THE FRESHWATER MUSSEL FAUNA IN THE MAURY RIVER ADJACENT TO BUENA VISTA, VIRGINIA

Prepared for:

DEPARTMENT OF THE ARMY
UNITED STATES ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096
CONTRACT # DACW65-92-M-0141

Prepared by:

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF NATURAL HERITAGE
MAIN STREET STATION
1500 EAST MAIN STREET, SUITE 312
RICHMOND, VIRGINIA 23219

DECEMBER, 1991

A SURVEY OF THE FRESHWATER MUSSEL FAUNA IN THE MAURY RIVER ADJACENT TO BUENA VISTA, VIRGINIA

Prepared for:

DEPARTMENT OF THE ARMY
UNITED STATES ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096
CONTRACT # DACW65-92-M-0141

Prepared by:

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF NATURAL HERITAGE
MAIN STREET STATION
1500 EAST MAIN STREET, SUITE 312
RICHMOND, VIRGINIA 23219
DECEMBER, 1991

This report should be cited as follows:

Stevenson, P. H. and Bulmann, K. A. 1991. A survey of the freshwater mussel fauna in the Maury River adjacent to Buena Vista, Virginia. Natural Heritage Resource Technical Report # 91-7. Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA. December, 1991. 13 pages.

INTRODUCTION

The United States Army Corps of Engineers(USACE) is currently engaged in a flood control project for the city of Buena Vista. The Maury River, a tributary of the James River, flows adjacent to Buena Vista and has been the source of several recent floods of the city. Upon the recommendation of the U.S. Fish and Wildlife Service, the USACE sought to perform a survey for two federally endangered freshwater mussel species, the James spinymussel, Pleurobema collina, and the dwarfwedge mussel, Alasmidonta heterodon. The USACE contracted with the Virginia Department of Conservation and Recreation's Division of Natural Heritage(DCR-DNH) to perform this survey.

The Division of Natural Heritage is the Commonwealth's principal manager of data on natural heritage resources, "the habitat of rare, threatened, and endangered plant and animal species, and rare or state significant natural communities or geologic sites, and similar features" (Virginia Natural Areas Preserves Act, Code of Virginia sections 10.1-209 et. seq.). The act mandates DCR-DNH to inventory natural heritage resources. These resources are indicators of the most environmentally significant and sensitive natural areas remaining in Virginia. By determining the status and location of each natural heritage resource occurrence, priorities for the conservation of Virginia's biodiversity can be established. This information can be provided to land managers for use in land use and natural resource planning.

METHODS

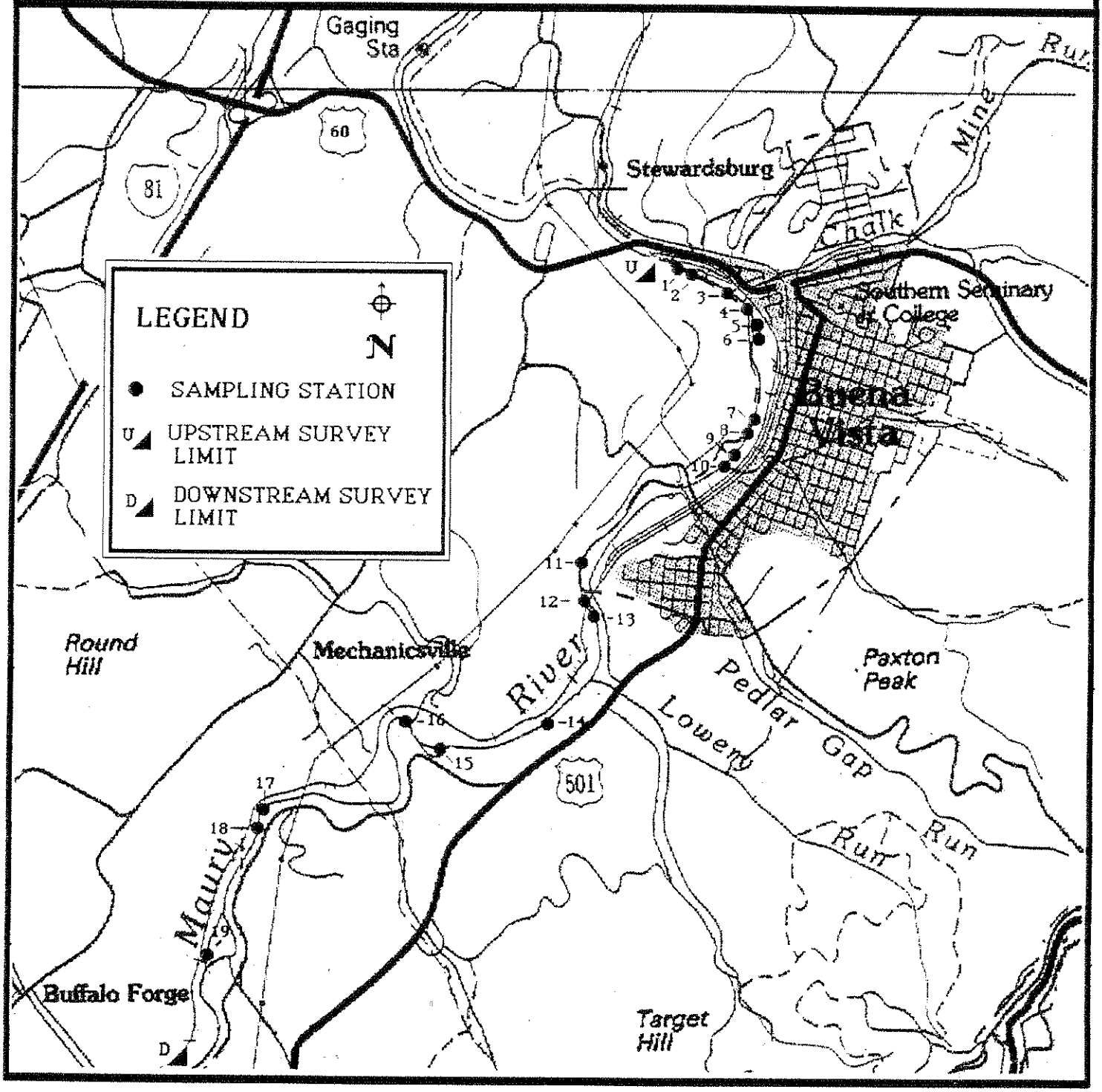
The survey area consisted of 8 continuous miles (12.9 kilometers) of the Maury River, in the City of Buena Vista and Rockbridge County, Virginia. The upstream boundary of the survey area coincided with the upstream boundary of the flood control project. This is located just upstream of the Georgia Bonded Fibers plant in Buena Vista and is immediately downstream of an existing dam. The flood control project extends downstream for 3 miles (4.8 km.) along the eastern bank of the river. The project ends at a railroad bridge at the southern boundary of Buena Vista. The survey area extended an additional 5 miles (8.0 km.) downstream of the project area as this was considered within the zone of impacts of the project. The survey area and sampling stations are indicated in Figure 1 on page 2. The original survey proposal required continuous survey of this area. An alternative method to more rapidly and selectively search the area and still provide reasonable certainty as to the status of the endangered mussels within the survey area was proposed by DCR-DNH and accepted by USACE and U.S. Fish and Wildlife Service.

The alternative survey was developed after the initial site visit by DNH staff. After reviewing DCR-DNH's Biological and Conservation Database occurrence records for the James spinymussel

MAURY RIVER SAMPLING STATIONS - 1991

1 : 50,000 SCALE

VA DEPARTMENT OF CONSERVATION & RECREATION DIVISION OF NATURAL HERITAGE



and the dwarfwedge mussel, it was found that when either of these species is collected, other mussel species tend to be collected (Clarke and Neves, 1984, Clench and Boss, 1967, Hove, 1990, Riddick, 1973, Virginia Department of Conservation and Recreation-Division of Natural Heritage, 1988-1990). Table I provides the results of this review. For a given number of other mussel species present in a collection, the number of collections of each endangered species is presented. Similarly, the data is provided for the number of other species represented as live specimens for the same collections of the endangered species. Collections of the dwarfwedge mussel in Virginia only have occurred in the presence of other species and only when live specimens of other species have been found. Collections of the James spinymussel largely included other mussel species. The 3 collections which included no other mussel species occurred in small creeks, 10 meters or smaller in width. For the 8 collections which included no live specimens of other mussel species, 5 included other species as dead specimens. All 5 of these collections were from small creeks also.

Table I Number of Other Mussel Species per Collection of Two Endangered Mussel Species

Number of Other Species per Collection	dwarfwedge mussel Number of Collections		James spinymussel Number of Collections	
	All Other	Live Other	All Other	Live Other
0	0	0	3	8
1	1	1	7	8
2	1	2	14	12
3	1	1	12	8
4	0	0	6	6
5	0	0	6	5
6+	2	1	4	3
Total Collections	5	5	51	48*

* 3 collections did not report if specimens live or dead.

The alternative survey method used this co-occurrence information to reduce the required effort to survey for the endangered species. This survey method involved finding any extant mussel populations of mussels as an indicator of the potential occurrence of the endangered species. As the Maury River is a moderate-sized river, 30 meters or more in width in the survey area, it is expected that if either endangered mussel species is present, additional mussel species will be present. If no extant mussel populations were found, the survey would be terminated due to the small likelihood of finding either endangered species. If any extant mussel populations were found, then additional survey effort would have been concentrated in the areas where mussels were found.

The alternative survey involved a two person team traversing the entire survey area during a two day period. The team used a combination of rapid search techniques and intensive search techniques. Rapid techniques are walking shorelines, seasonal channels, and exposed bars visually searching for mussel shells. Waterscoping and substrate raking are included also. Intensive search techniques are methodical snorkeling and waterscoping. Raking of larger substrate areas is also employed. An intensive search requires 2 man-hours; and, a rapid search requires 1/2 to 1 man-hour.

This survey concentrated effort in higher quality portions of habitat. Sampling stations were chosen on the basis of low silt deposits, permanent flow, reduced algal growth, low channel disturbance, and other appropriate factors. Intensive search techniques were reserved for the best sampling stations. There were 5 intensive sampling stations. As many rapid sampling stations as practical were established and surveyed. All sampling was performed on October 23, 29, and 30, 1991.

RESULTS AND DISCUSSION

No specimens of the James spinymussel, Pleurobema collina, and the dwarfwedge mussel, Alasmidonta heterodon, were found within the survey area. No live specimens of any freshwater mussel were found. Shells of several mussel species were found and are listed in Table II; no shells are considered to have come from freshly dead specimens. The exotic Asiatic clam, Corbicula fluminea, was the only bivalve found live.

Table II Mussel Specimens Collected in the Maury River, 1991

Species	Station 1	3	6	7	12
Alasmidonta undulata	1RF			1RF	
Elliptio angustata		1RV, 1RF			
Elliptio lanceolata			1RV		
Elliptio sp.(unidentified)					1RF
Strophitus undulatus		2RF			
Villosa constricta		1V			

F = Fragment, less than 50% of valve remaining
R = Relict, Periostracum >50% eroded, nacre chalky & dull
V = Entire Valve

The sampling stations visited are shown in Figure 1. These stations are numbered in sequential order from upstream to downstream. Each station represents where a separate sampling effort was performed. By comparing Table II to Figure 1, the approximate locations of all specimens found can be determined. All specimens came from the upper portion of the survey area. Furthermore, only one specimen came from below Station 7, which is approximately 1 mile (1.6 km.) from the upstream boundary of the survey area. Further information on each survey area is provided in the following discussion and Appendix A.

The survey area was quite noticeably impacted from a variety of sources, some historical. Siltation was evident, particularly in the areas adjacent Buena Vista. Eutrophication was prevalent and was indicated by a typically dense growth of filamentous alga dominating the substrate surface. Historical impacts here include a canal system which extends throughout the entire survey area. This canal system included several lock and dam structures which impounded large portions of the river. All dams in the survey area are partially breached at present; but, still impound some of the river. Buena Vista has a large number of industrial facilities, most currently not operating, which likely contributed significant effluent to the river in the past. Only one industrial facility was observed disposing effluent into the river. There is also a municipal sewage treatment plant within Buena Vista which produces effluent.

In the uppermost areas sampled, Stations 1, 2, and 3, a brownish filamentous algae grew on the exposed cobble substrate. The substrate next to the eastern shore was moderately to heavily silted while the substrate to the opposite side was moderately silted, with silt deepest in the slow water just upstream Chalk Mine Run. The western side had a steeper bank which appeared to be eroding. Station 1 was in the riffles immediately below the existing dam. A single relict specimen was found adjacent the western shore. Station 2 was a search of the eastern shoreline areas and produced no mussel specimens. Station 3, in the gently run and pool area below between the riffles and Chalk Mine Run was where the greatest number of specimens was found. All of these specimens were found adjacent the western shore and near the tail of the upstream riffles. Snails were very scarce in this area; and, none were seen in the uppermost part. Corbicula was present both as live individuals and shells, but was not very common.

Station 4, immediately below Chalk Mine Run, was somewhat improved over the upstream regions and snails became more common. This area was moderately well flowing and the pool area upstream of Chalk Mine Run graded into riffle and rapids at the island complex adjacent Factory Street. There was a further modest improvement in habitat quality as aquatic vascular plants were noticeably more common, but alga still dominated the substrate surface.

Station 5 and 6 were searches of various portions of the river associated with the island complex at Factory Street. Station 5 was an initial search of the eastern shoreline from roughly 100 m above the island complex to 50 meters below the tail of the easternmost island. The island complex itself consists of 3 islands in the main course of the river. Each island is elongate in form and roughly meters long. The islands are arranged with their long dimension parallel to the current, and are roughly abreast in the river, dividing the river into 4 separate channels. The two channels surrounding the westernmost island were dry at the time of the survey. Station 6 represented an intensive search of the easternmost channel which was also the largest. This channel consisted of moderately good habitat. The substrate graded from largely cobbles in the riffle/rapids at the head of the island to pebble, gravel and sand in a moderate run and eddy near the downstream third of the island. The tail of the island had a riffle of moderate length, 30 meters long, which led to a long pool area. The channel searched here was roughly 90 meters long. A 45 m transect of the main channel in the run area and upstream was searched by snorkel for 1 man-hour, yielding no mussels. Corbicula was common here as were aquatic snails. Crayfish were also observed. Overall the site appeared eutrophic; however, the swift current likely keeps excessive silt or organic matter from becoming deposited. Further searching here included walking the 2 dry channels and the other flowing channel. The only mussel specimen was found on a bedrock shelf adjacent the westernmost island. It was a relict specimen and appeared to have washed onto the shelf from somewhere upstream.

Below Station 6 and above Station 9 the river is generally a long pool habitat. The river is wide, 50 m, and the current very slow. The substrate tends to be relatively fine on the surface here; however, the silt and sand frequently overlies a cobble or bedrock substrate. Station 7 was a search of the nearshore areas of this pool adjacent the upstream end of Glen Maury Park. Searching did reveal 1 relict fragment of one mussel specimen. This fragment was missing sufficient features to allow accurate identification; it was tentatively identified as a specimen of the genus Elliptio, species unknown. Station 8 was a search of a small run area located in the lower part of the pool. The channel was slightly constricted here and there was a moderately silted cobble substrate and shoreline cobble bars. Snails were commonly observed. Some Corbicula were again found. No mussels were observed.

Station 9 involved an intensive search of the upstream of two islands located at the end of this pool and 0.4 mile above the 10th Street bridge. The habitat was similar to that observed in the channel searched at Station 6 except that no riffle was present at the tail of the island. Substrate graded from cobble in the riffle at the island's head to sand and gravel near the tail. This island was part of a two island complex. The downstream island was much

larger and had water flowing in both channels around it. At this upstream island, there was no water flowing in the western channel next to Glen Maury Park. The search here involved 1 man-hour of snorkeling in the channel adjacent the upstream island. Additionally, adjacent banks , the dry channel, and nearshore aquatic habitats were searched for 1 man-hour. No mussels were found. Overall, this area seemed to have the best quality of habitat seen in Buena Vista. Alga was reduced in extent compared to upstream sites and aquatic vascular plants were relatively common. Corbicula and snails were common.

At Station 10, a search of the channel between the downstream island and Glen Maury Park was performed. This area was largely run habitat with sand and gravel substrate. The general ecological conditions here were very similar to those at Station 9 upstream. Corbicula was found. Again, there was relatively low algal growth and a moderate growth of aquatic vascular plants. Snails were common. Below this island, the river is largely pool or slow run habitat. On the side of this island opposite Buena Vista, a municipal sewage outfall enters the river; and, there is a dramatic increase in the amount of alga growing in the river below the islands here.

The next area searched was adjacent the Rea Magnet Wire facility. The area searched was from the head of a large rapid to its terminus in a pool roughly 500 meters downstream. Station 11 was a search of the length of the rapid and riffle by waterscoping. The substrate was largely cobble at the tail of the riffles and graded to exposed bedrock at the head of the riffle/rapid area. All stream margins were also checked for shells. At this site, there is a flood channel located east of the river channel. This channel was also examined. Station 12 was an intensive snorkeling of the lower end of the riffle area. During this search a single relict specimen of Alasmidonta undulata, the triangle floater, was excavated from roughly 0.3 meter deep in gravel. No mussel specimens were found in any of the sampling stations further downstream. Station 11 and Station 12 were considered together to represent a complete intensive search station.

Station 13 included the pool area adjacent the railroad crossing south of Buena Vista. Also included were the channels surrounding the small island downstream of the bridge. The channels about the island were fast flowing riffles with cobble substrate. There was also a dense algal growth here. Snails and Corbicula were common here. Immediately downstream of the island the riffles rapidly graded to slow run or pool type habitat with bedrock substrate. This habitat would predominate for the remainder of the survey area; and, there would be few extents of riffles or rapids with cobble or gravel substrate.

The next station downstream was performed in a fairly small patch of marginal quality habitat. Station 14 was a limited extent

of cobble substrate, shallow water, and faster flow in the typically bedrock-lined pools of the river here. Alga grew thickly, nearly completely covering a moderate growth of aquatic vascular plants. Limited waterscoping was performed and both shorelines were examined. Station 16 was somewhat similar; however, it differed from Station 14 in that there were fringing bars only on the western shore at the confluence of an unnamed tributary. At both stations, Corbicula and aquatic snails were common.

Station 15 was an intensive search station at an unnamed island. A historic dam structure was located here, partially obstructing the western channel around the island. Current flowed well around the island. The eastern channel was snorkeled for 1 man-hour. There was excellent substrate here, with much sand, gravel and pebbles in the upper reach of the eastern channel. The substrate became much coarser as one traveled downstream along the island. This channel was fairly narrow (<10 meter wide) and was well-shaded. The alga growth was much abated in the shaded areas. The western channel consisted of a large plunge pool below the dam and the substrate was coarse cobble and boulder downstream of the pool. All search efforts were concentrated in the eastern channel and along the head and tail of the island. Snails and Corbicula were abundant. Darters were also noted to be common here.

Goose Neck Dam was the general locale of Stations 17 and 18. Station 17 involved a search of the shoreline areas from the existing historic dam upstream 300 meters. Station 18 was a search of a large bar area 100 meters below the dam. The river flowed very well above the dam. The habitat type was riffle and rapid. There was some exposed bedrock, generally to the western side; the substrate to the eastern side tended to be cobble and gravel. Alga grew densely among the cobbles here. Below the dam, there was bar of gravel and cobbles on the western shore. This bar was about 100 meters long. The substrate here rapidly graded to bedrock as one traveled progressively downstream its length. At both stations, Corbicula and aquatic snails were common.

The furthest downstream station was Station 19, located at the western channel of a large island. The eastern channel here was dry at the time of the survey. This western channel was 30 meters wide and composed of a mix of riffles, rapids and small pools. Extensive snorkeling was performed in the largest of these pools and in the upstream riffles. This area was in the downstream part of the channel. Additional searching here included shoreline searches from the island head to the tail, substrate raking, and waterscoping. Again, Corbicula and snails were common. Fish were moderately common. It was noted that the dense algal growth had seemed to abate somewhat at Goose Neck Dam; and, there appeared to be a continued decline in the abundance of alga here.

As no live mussels and no evidence of recent populations were found, the survey was terminated with the conclusion that there

were no extant populations of either endangered species present. Further supporting this claim is that sampling conditions were excellent. Water visibility was such that the bottoms of pools over 2 meters deep could be easily seen. Water level at the Buena Vista gauging station was 1.3 feet during the survey, which is near the historic minimum(Prugh et al, 1991). Of the specimens found, only one was not definitely assignable as a relict shell. This specimen was also obviously not fresh as the nacre was somewhat eroded. The Maury River has hard water in the survey area which confounds classifying specimen status as the erosion of shell carbonate is lowered due to the high pH of the water. The abundance of other mollusks with much higher dispersal ability than unionid mussels in the survey area seems to indicate that current conditions are generally favorable to support mollusks and potentially some mussels, but the mussel fauna was previously eliminated and has yet to reinvade the area.

RECOMMENDATIONS

No populations of the endangered mussel species, the James spinymussel, Pleurobema collina, and the dwarfwedge mussel, Alasmidonta heterodon, or other rare species were located. The proposed flood control project should not impact known populations of either species.

REFERENCES CITED

Clarke, A. H. and R. J. Neves. 1984. Status Survey of the James River Spiny Mussel, Canthyria collina, in the James River, Virginia. Rpt. to US Fish and Wildlife Service.

Clench, W. J. and K. J. Boss. 1967. Freshwater Mollusca from the James River, VA and a New Name for Mudalia of Authors. Nautilus 80(3): 99-102.

Hove, Mark. 1990. Distribution and Life History of the James Spinymussel, Pleurobema collina(Bivalvia: Unionidae). Unpub. MS Thesis. Virginia Polytechnic Institute and State University. Blacksburg, Virginia.

Prugh, B. J. et al. 1991. Water Resources Data - Virginia - Water Year 1990. Volume 1. Surface Water and Surface-Water-Quality Records. U.S. Geological Survey, Water Resources Division. Richmond, Virginia.

Riddick, Marceile J. 1973. Freshwater Mussels of the Pamunkey River System, Virginia. Unpub. MS Thesis. Virginia Commonwealth University. Richmond, Virginia.

Virginia Dept. of Conservation and Recreation- DIvision of Natural Heritage. 1988-1991. Field Surveys.

APPENDIX A

The following list of survey stations corresponds to those shown in Figure 1 of the report. Effort reported here is person-minutes of search time. All stations were performed by Kurt Buhlmann and Phil Stevenson of DCR-DNH working simultaneously; hence, elapsed time at any station is one half of the search effort. Craig Seltzer of the U. S. Army Corps of Engineers, Norfolk District, accompanied DCR-DNH staff during the searches of Stations 2, 5, 7, and 11.

Station	Date	Location	Effort
1	10/29/91	Georgia Bonded Fibers, from upstream of plant to just below industrial ponds, Buena Vista.	120
2	10/23/91	Georgia Bonded Fibers, shoreline adjacent to plant, Buena Vista.	60
3	10/29/91	From 200 m upstream Maury River confluence with Chalk Mine Run, Buena Vista.	60
4	10/29/91	From confluence with Chalk Mine Run to 100 m downstream, Buena Vista.	50
5	10/23/91	Shoreline adjacent to cement plant off Factory Street, Buena Vista.	50
6	10/29/91	Island complex adjacent to cement plant off Factory Street, Buena Vista.	120
7	10/23/91	Glen Maury Park, at upstream end of park road paralleling river, Buena Vista.	50
8	10/29/91	Glen Maury Park, shallow run area circa 100 m downstream of the upstream park boundary, Buena Vista.	30
9	10/29/91	Upstream island adjacent Glen Maury Park, ca. 500 m upstream 10th Street Bridge, Buena Vista.	120
10	10/29/91	Downstream island adjacent Glen Maury Park, ca. 500 m upstream 10th Street Bridge, Buena Vista.	60
11	10/23/91	Rapids adjacent to Rea Magnet Wire Facility, 200 m to 700 m upstream of railroad bridge, Buena Vista.	150

Station	Date	Location	Effort
12	10/30/91	Pool and riffle adjacent Rea Magnet Wire Facility 200 m upstream railroad bridge, Buena Vista.	60
13	10/30/91	Island 50 m downstream railroad bridge, Rockbridge County.	50
14	10/30/91	Small bars and riffle, 2.4 air km east of Mechanicsville, Rockbridge County.	30
15	10/30/91	Island 1.5 air km ESE Mechanicsville, Rockbridge County.	120
16	10/30/91	Confluence with unnamed tributary 1.1 air km ESE of Mechanicsville, Rockbridge County.	30
17	10/23/91	Upstream of Goose Neck Dam, Rockbridge County.	60
18	10/30/91	Bar 0.1 km downstream of Goose Neck Dam, Rockbridge County.	30
19	10/30/91	Island 1.6 air km NNE of Buffalo Forge Station, Rockbridge County.	120